Cost and Sales Results of Alternative Methods of HANDLING BANANAS at Retail

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PREFACE

This study of methods of handling bananas is a part of an overall study of retail produce departments. The study on which this report is based was conducted under authority of the Agricultural Marketing Act of 1946, and under the supervision of R. W. Hoecker, head, Wholesaling and Retailing Section, Transportation and Facilities Branch, Marketing Research Division, Agricultural Marketing Service.

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INTRODUCTION

Bananas account for about 5 percent of the sales of the produce department of retail food stores. How such an important item can be handled at the lowest cost is useful for the retailer to know. While cost is an important factor to consider in selecting a method of handling bananas, the retailer must also consider the effect of the handling method on sales volume. The retailer's objective is to select the lowest cost method of handling which does not impair his sales volume.

This study analyzes 5 methods of preparing bananas at retail in terms of their effects upon labor costs, materials costs, and costs of consumer damage to bananas; and it analyzes 2 of the 5 methods in terms of their effects upon sales volume. Data were collected in 7 stores.

The 5 methods are as follows: (1) The hands of bananas are broken into customer-size bunches and placed on display. Customers select bunches and take them to the customer service scale to be bagged, weighed, and price marked. For convenience, this method is called "bulk." (2) The second method consists in breaking the hands into bunches, weighing, and price marking the bunches in the backroom. It is called the "bulk-prepriced" method. (3) The procedure of the third method is similar to that of the second except a band of gummed tape made of 60-pound bleached kraft paper 1 inch wide is wrapped around each bunch to hold the bananas together. This is the "banded-kraft" method. (4) The fourth or "banded-crepe" method is identical with the third except that pressure-sensitive crepe-backed paper tape one-half inch wide is used. (5) In the fifth method bananas are bought packaged in 2 sizes of trays overwrapped with cellophane. The packages are weighed and price marked in the store. For reference, this method is called "cello-tray." Bunches prepared by these 5 methods are illustrated in figure 1.

The "banded-crepe" and "bulk-prepriced" were studied to determine their effect upon sales. The test was designed to measure change in sales volume resulting from substitution of "banded-crepe" for "bulk-prepriced."

Figure 1.--Bananas ready for display prepared by the techniques tested.

COMPARISON OF COSTS FOR FIVE METHODS

Labor and materials comprise the direct costs of preparation in the retail store. The direct labor costs of the operations, using the best work methods, workplace arrangements, and equipment known to the researchers were determined by time study. The comparative direct labor costs of 5 methods of preparing and displaying 1,000 pounds or 25 boxes of bananas at a wage rate of $1.20 per hour are presented in table 1.

Although the totals of direct labor cost show the lowest figure--$2.39--for the "cello-tray" method, this figure is not directly comparable with the others because much of the labor is paid for in the premium of 2 cents per pound in the cost of these packaged bananas. For "cello-tray," preparation in the backroom includes only weighing and price marking the packages. Since no banding operation is necessary for "bulk-prepriced," cost of preparing in the backroom is lower than for the "banded-kraft" and "banded-crepe" methods.

When the "bulk" method is used, the operator divides the hands of bananas into bunches as he places them on display. Combining these 2 operations limits the operator to using 1 hand to display the bananas 1 bunch at a time instead of using both hands to display them 2 bunches at a time. Hence, the display operation includes the extra job of dividing hands of bananas into

bunches and it utilizes an inefficient way of placing the bunches of bananas in display. This explains why the cost of display is highest for the "bulk" method.

Table 1.--Comparison of direct labor costs of 5 methods of handling 1,000 pounds of bananas in 7 retail stores 1/

Item of cost	Bulk	Bulk-prepriced	Banded-kraft	Banded-crepe	Cello-tray
	Dollars	Dollars	Dollars	Dollars	Dollars
Preparation in backroom 2/	0	2.06	2.75	2.72	1.54
Display (includes breaking hands for "bulk")	1.88	.85	.82	.82	.80
Weigh and price mark at customer service scale	6.91	.67	0	0	0
Prepare markdowns	.42	.42	.29	.29	.05
Total direct labor cost 2/	9.21	4.00	3.86	3.83	2.39

1/ Costs are based on a wage rate of $1.20 per man-hour. The number of units of bananas handled is based on an average weight per bunch of 1.75 pounds and an average weight per cello-tray of 2.41 pounds. For "cello-trays" costs are computed for 963 pounds since shrink-before-display has already been absorbed before the bananas reach the retail store.

2/ These data do not show the indirect labor cost included in the premium of 2 cents per pound which the retailer must pay for the "cello-tray" bananas.

The high cost of weighing and price marking shown for the "bulk" method is caused by the delays and other inefficiencies inherent in weighing and price marking at the customer service scale. This costly method of price marking is necessary to some extent with the "bulk-prepriced" method because customers tear off bananas from the prepriced bunches and about 11 bunches have to be weighed at the customer service scale for every 100 prepriced bunches put into display.

Direct costs of materials for each 1,000 pounds of bananas received in the retail store and prepared by the 5 methods are:

"Bulk"	$1.36
"Bulk-prepriced"	.25
"Banded-kraft"	.68
"Banded-crepe"	2.51
"Cello-tray"	.02

Again the figure for "cello-tray" is not directly comparable with the others.1/ The materials cost for the "bulk-prepriced" method was lowest because the only materials used were bags and materials needed for making markdowns. The important comparison of materials cost, however, is between "banded-kraft" and

1/ Materials cost for "cello-tray": cellophane and tray, 3.2 cents for the 2.79-pound package, and 2.4 cents for the 1.41-pound package. Materials cost to packer: $11.92 per 1,000 pounds of bananas on the basis of the proportion of 72.7 percent large packages and 27.3 percent small packages observed in this study.

"banded-crepe." The kraft tape costs much less per foot than the crepe-backed tape 2/, which accounts for all of the difference in materials cost for the 2 methods.

The third important item of cost in handling bananas at retail is shrink due to spoilage. As indicated in table 2, this shrink is logically divided into shrink before the bananas are displayed and shrink while the bananas are on display. Shrink before display arises from some bananas being damaged or having deteriorated to the extent that they are unfit for sale at the regular retail price. This part of shrink is not affected by the method of preparation in the retail store. 3/

Table 2.--Comparative shrink in 1,000 pounds of bananas handled by 5 methods in retail stores 1/

	Bulk	Bulk-prepriced	Banded-kraft	Banded-crepe	Cello-tray
	Dollars	Dollars	Dollars	Dollars	Dollars
Shrink before display 2/....	3.70	3.70	3.70	3.70	0
Shrink during display.....	2.00	2.00	.40	.40	.48
Gross shrink.....	5.70	5.70	4.10	4.10	.48
Less sale of markdowns.....	1.05	1.05	.90	.90	.15
Net shrink.....	4.65	4.65	3.20	3.20	.33

1/ Based on a retail price of 13 cents per pound, markup on retail of 25 percent, and a premium of 2 cents per pound on cost of packaged bananas. This refers to the weight of bananas at the time of arrival in the retail store.

2/ Shrink before display for the "cello-tray" method is incurred by the packer.

Shrink during display is affected by the method of preparation used in the store. The lower shrink for the "banded" methods compared with the "bulk" and "bulk-prepriced" methods occurs because the bands of tape effectively discourage customers from tearing bananas from the bunches and often ruining them by exposing the bare ends of the fruit. 4/ A display of banded bananas

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2/ The cost figure for kraft tape is based on using tape of 1 color. Tapes printed in 2 colors and bearing the name of the store or other information are available. To use such tape would increase the cost from 68 cents to 82 cents.

3/ It is assumed that, no matter which method is used, bad bananas will be culled out before display so that the general quality of the display is maintained at a high level. Failing to do this results in broken bunches and dissatisfied customers.

4/ The effectiveness of tape in this respect is reduced by not providing an adequate assortment of sizes of bunches in the display. In the store in which "banded-crepe" was tested, dividing each box of bananas displayed into 2 bunches of 2 bananas, 3 bunches of 3 bananas, and the remainder fairly evenly divided among bunches of 4, 5, and 6 bananas--depending on their size and price--was found to provide adequate variety in size of bunches.

is shown in figure 2. The "cello-tray" method yields the lowest shrink during display because the tray and cellophane overwrap reduces bruising caused by customers mashing the bananas and eliminates damage caused by customers tearing the bunches apart.

Figure 2.--Display of bananas prepared by the "banded-crepe" method.

The costs of preparation of bananas are summarized in table 3. The lowest processing cost is that for "banded-kraft" because no weighing and price marking at the customer service scale is required, and the net shrink and cost of materials are relatively low. 5/

5/ If 35-pound bleached kraft tape were substituted for the 60-pound tape, materials costs would be $0.79 for each 1,000 pounds of bananas handled despite the fact that the cost per foot of the lighter tape is less than that of the heavier tape. This is because 75 percent more of the lighter tape is required to obtain sufficient strength. The direct labor costs using the 35-pound tape would be $4.26 per 1,000 pounds of bananas because of the additional time required to apply 2 layers of tape.

Table 3.--Summary comparison of costs of 5 methods of preparing 1,000 pounds of bananas for display in retail stores 1/

	Bulk	Bulk-prepriced	Banded-kraft	Banded-crepe	Cello-tray
	Dollars	Dollars	Dollars	Dollars	Dollars
Direct labor	9.21	4.00	3.86	3.83	2.39
Materials cost	1.36	.25	.68	2.51	.02
Added purchase cost of packaged bananas	0	0	0	0	2/ 15.65
Net shrink	4.65	4.65	3.20	3.20	.33
Total	15.22	8.90	7.74	9.54	18.39

1/ Figures are computed on the basis of 9.63 pounds of bananas by the "cello-tray" method since the shrink before display is incurred before the bananas reach the retail store.

2/ This is the difference between 1,000 pounds at 9.75 cents ($97.50) and 9.63 pounds at 11.75 cents ($113.15).

WORK METHODS AND EQUIPMENT

The handling cost results shown in table 1 can be achieved only by good work methods, good workplace arrangement, and proper equipment. For example, in preparing bananas with crepe-backed tape, a right-handed operator places the bananas to the right of the scale and a container to receive finished bananas to the left of the scale (fig. 3). He then picks up a bunch of bananas with his right hand and places it on the scale. The operator reads the price of this bunch as he moves another bunch to the scale with his right hand. He picks up the first bunch in his left hand and pulls out tape with the right; he moves the bunch into position (fig. 3) and slips the end of the tape under his left thumb. He breaks the tape off with his right hand and wraps it over the end held under his left thumb. With the bunch in the left hand, he writes on 1 of the bananas the price and number of bananas in the bunch. As he disposes of the bunch with his left hand, he takes a new bunch with his right and reads the price of the bunch on the scale. After a short period of practice this becomes an easy, rhythmical operation.

Three types of scales were evaluated to determine the one with which weighing and pricing could be done in the shortest time. The standard time to weigh and price, using the low platform scale (fig. 3), was 0.104 minute per bunch of bananas. With the high platform scale it was 0.123 minute; with the fan type scale it was 0.161 minute. 6/

Banding with kraft tape was done with an electrically operated machine which moistened and cut the tape into proper lengths. Costs of banding with crepe-backed tape are based on banding by hand using the tape dispenser (fig. 1). Two experimental machines for banding with crepe-backed tape were tested but neither machine yielded a production rate as high as that realized by hand banding.

6/ These times include an allowance of 15 percent for personal and fatigue time.

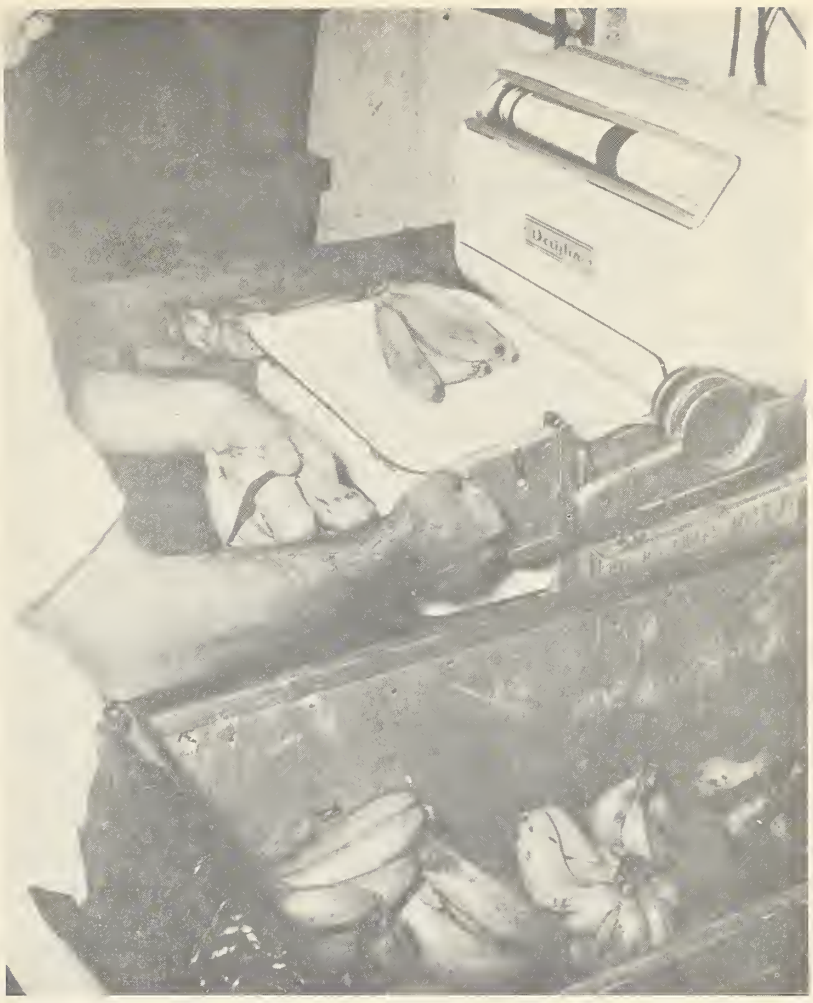

Figure 3.--Workplace for preparing bananas for display by the "banded-crepe" method.

COMPARISON OF SALES FROM TWO METHODS

A test was conducted to measure the change in sales that would result from substituting the "banded-crepe" method for the "bulk-prepriced" method. For a control period of 20 weeks the sales of bananas and of produce were recorded in 4 stores of a chain in which bananas were prepared by the "bulk-prepriced" method. Then during a test period of the next 29 weeks 1 of the 4 stores prepared bananas by the "banded-crepe" method while the others continued to use "bulk-prepriced," and banana and produce sales were again recorded. 7/

7/ The size and location of banana displays were held constant among stores for the entire 49-week period.

In each store there was a decline in the sales of bananas and of other produce from the control period to the test period. But in each case banana sales declined by a greater percentage than did other produce sales. For the test store, however, the decline in banana sales compared with that for other produce was only about one-third as great as for each of the control stores. This difference appears to have resulted from the difference in methods of preparation. On this basis, it is calculated that the "banded-crepe" method in this experiment increased banana sales by 14 percent over the "bulk-prepriced" method.

The effect upon sales of the "banded-kraft" method was not measured. If 1 solid color kraft tape is used, the appearance of the banded banana bunches is changed from that of bunches banded with crepe-backed tape only by the fact that the kraft tape is 1 inch wide whereas the crepe-backed tape is one-half inch wide.

COMPARISON OF RETURNS FROM THREE METHODS

The data in table 4 are designed to compare results, after the effect upon sales has been considered, of the 3 methods with the lowest handling costs. Data in the table are based upon sales resulting from receipt of 1,000 pounds of bananas in a store using the "bulk-prepriced" method. The calculated 14-percent increase in banana sales is then reflected in the data pertaining to "banded-crepe." Since no information is available on the effect of "banded-kraft" upon sales, the results for that method are shown both for the assumption that sales are unchanged relative to sales using "bulk-prepriced" and for the assumption that "banded-kraft" will result in a 14-percent increase in sales over "bulk-prepriced." 8/

The amount of gross margin minus labor and materials costs, in the last line of table 4, is indicative of the amount of return that can be expected from each method. 9/ Comparing first the 2 methods for which comparative sales data are available, "banded-crepe" yields better operating results than the "bulk-prepriced" method. But if the 14-percent sales increase realized under "banded-crepe" could be obtained under "banded-kraft," it would yield the best operating results. If the "banded-kraft" method resulted in no change in sales compared with "bulk-prepriced," it would still yield more favorable operating results than the "bulk-prepriced" method. In summary, the "banded-crepe" method

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8/ Kraft tape carrying a printed sales message can be obtained at a higher cost than solid color tape. The amount of the increase in cost depends upon the number of colors used. The cost for 2-color tape is shown in footnote 2.

9/ The net return from sale of bananas would of course be gross margin minus direct labor and materials costs and overhead costs. Since the amount of overhead costs would not be affected by the methods of preparation, the same amount would be subtracted from gross margin minus labor and materials costs to obtain the net return resulting for any one of the methods for which data are shown in table 4.

Table 4.--Gain to net sales and gross margin factors from "banded-crepe" and "banded-kraft" compared with "bulk-prepriced" for each 1,000 pounds of bananas received under "bulk-prepriced" 1/

	Bulk-prepriced	Banded-crepe reflecting 14-percent sales increase	Banded-kraft Assuming no change in sales	Banded-kraft Assuming 14-percent sales increase
	Dollars	Dollars	Dollars	Dollars
Net sales	123.64	140.95	123.64	140.95
Cost of stock 2/	97.50	109.44	96.00	109.44
Gross margin	26.14	31.51	27.64	31.51
Direct labor and materials cost	4.25	7.12	4.47	5.10
Gross margin less labor and materials cost	21.89	24.39	23.17	26.41

1/ Data are based on a retail price of 13 cents per pound and a markup of 25 percent of selling price.

2/ Losses from shrink are included in net sales and cost of stock since net sales represents sales at regular price and at markdown price and cost of stock includes cost of all bananas received.

appears to be superior to the "bulk-prepriced" method. Whether the "banded-kraft" method would produce the most favorable operating results of the methods tested depends upon the sales results it would yield compared with the "banded-crepe" method.

This comparison of returns from the 3 methods is based on a retail price of 13 cents per pound and a markup of 25 percent of selling price. Under other conditions of price and markup the comparison would be different. The difference in gross margin minus labor and materials cost between "bulk-prepriced" and "banded-kraft," assuming equal sales, would decrease as retail price and markup decreased, but it would continue to be in favor of the "banded-kraft" method. A sales increase from banding is required to compensate for the higher labor and materials costs of the "banded-crepe" method compared with the "bulk-prepriced" method. The percentage of sales increase required of banding to offset these higher costs is shown in table 5 for odd prices ranging from 9 to 25 cents per pound and for 4 levels of markup.

To illustrate the use of table 5, suppose the retail operator is selling bananas for 15 cents per pound at a markup of 25 percent. The percent net sales increase required is determined by going down the left hand column to 15 cents, then across to the column for markup headed 25 percent to the figure 0.9. This indicates that a sales increase of only 0.9, or about 1 percent under the "banded" method is required to offset the higher costs of "banded-crepe" compared with "bulk-prepriced." Sales increases of more than 1 percent result in higher returns from the "banded-crepe" method than from the "bulk-prepriced" method under these conditions of price and markup. Minus figures

in table 5 indicate that at those levels of price and markup, the returns from "banded-crepe" are equal to returns under "bulk-prepriced" when the sales volume realized under "banded-crepe" is less than that realized under "bulk-prepriced." To illustrate this point, at a price of 19 cents and a markup of 25 percent the returns from "banded-crepe" will equal the returns from "bulk-prepriced" when sales volume under "banded-crepe" is 0.6 percent less than could be realized under "bulk-prepriced."

Table 5.--Percent net sales increase required to offset the additional direct costs of "banded-crepe" over costs of "bulk-prepriced" at different prices and at 4 levels of markup 1/

Retail price per pound (cents)	Markup percent of selling price			
	20	25	30	35
	Percent	Percent	Percent	Percent
9	10.6	7.3	5.8	5.0
11	5.3	4.1	3.5	3.1
13	2.5	2.2	2.0	2.0
15	0.7	0.9	1.1	1.2
17	-0.6	0	0.4	0.6
19	-1.5	-0.6	-0.2	0.2
21	-2.2	-1.1	-0.6	-0.2
23	-2.7	-1.6	-0.9	-0.5
25	-3.2	-1.9	-1.2	-0.7

1/ These figures are based on a wage rate of $1.20 per hour and materials prices in effect in July 1956.

An important relationship shown is that lower retail prices of bananas require larger sales increases from banding to offset the higher costs of the "banded-crepe" method. The lower levels of markup also require greater sales increases from banding. Any retailer must consider the retail price and level of markup prevailing in his own market when deciding whether to use the "banded-crepe" or the "bulk-prepriced" method. The retailer must also consider whether he can expect to obtain the amount of sales increase from banding necessary to make the "banded-crepe" method yield better operating results for him. Table 5 is a useful aid to the retailer in deciding between these 2 methods of handling bananas in his own particular situation.

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